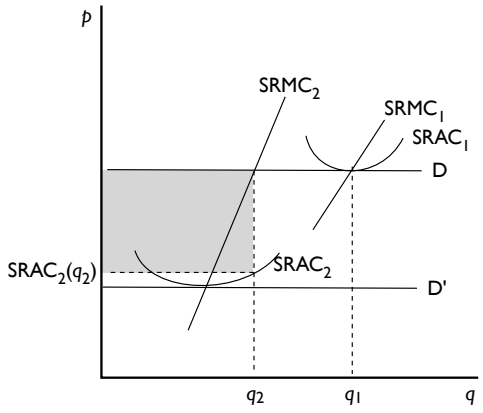
ECON 224, Professor Hogendorn

Problem Set 2 Answers

1. *OilWells_a.*



(a) A type-2 firm produces quantity q_2, determined from setting its marginal cost equal to its price. Its profits are

$$(p - SRAC_2(q_2))q_2$$

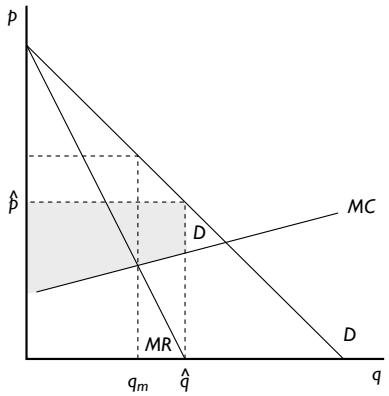
which is shaded on the graph.

(b) Since the rents are Ricardian, they cannot be reproduced. No other oil wells can become type-2 wells. Therefore, the type-2 wells will continue to earn these rents in the long run, and the type 1 rents will remain in business and continue to earn zero economic profit.

(c) Since there are large rents to using the type-2 technology, the type 1 wells and/or new entrant wells will want to adopt it. As they do adopt it, this will push the industry supply curve to the right, lowering the price. Eventually, the price will fall to

D', at which point there will be many more type-2 wells, all earning zero economic profit. No type-1 wells will be able to remain in business.

2. *ProfitMax_a.*



(a) No, this firm does not maximize profits because the marginal cost of $\hat{q}$ is greater than the marginal revenue. Profits would therefore rise if the firm cut output. The profit-maximizing output is where $MR + MC$, labeled q_m on the diagram.

(b) Yes, there is a deadweight loss, labeled D in the diagram. It is obviously larger than the zero deadweight loss that would occur if the firm behaved like a perfect competitor, but it is smaller than the deadweight loss of a profit-maximizing monopoly.

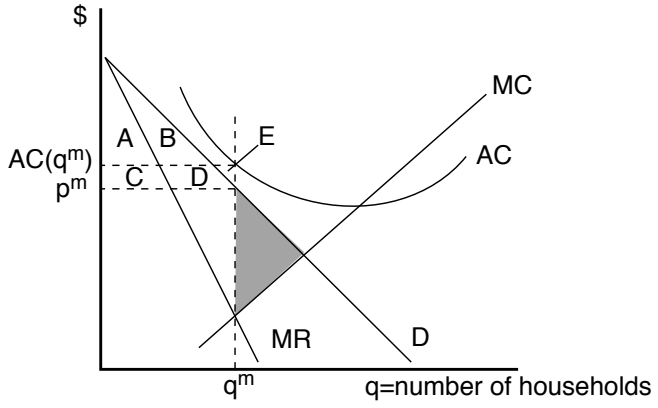
(c) Yes, if there is some chance the government will regulate the firm, it might want to avoid the image of being an inefficient monopoly. Increasing output, and thereby decreasing price and deadweight loss, is a way of making the firm less costly to society. Of course, this comes at the expense of reduced profits, but those profits might still be higher than what would be earned under regulation.

(d) The operating profit is the revenue minus the variable cost. In this case, total revenue is equal to the area $\hat{p}\hat{q}$. Total variable cost is the area under the marginal cost curve between $q = 0$ and $q = \hat{q}$. The difference between these is operating profit, the shaded trapezoid in the figure.

3. *RuralBroadband_a.*

(a) Given that the MC is upward sloping, AC will be U-shaped and cross MC at its lowest point. But it can shift anywhere up or down along the MC curve depending on how large the fixed costs are. In this case, fixed costs are very high relative to demand, which makes sense since infrastructure industries usually have high fixed costs.

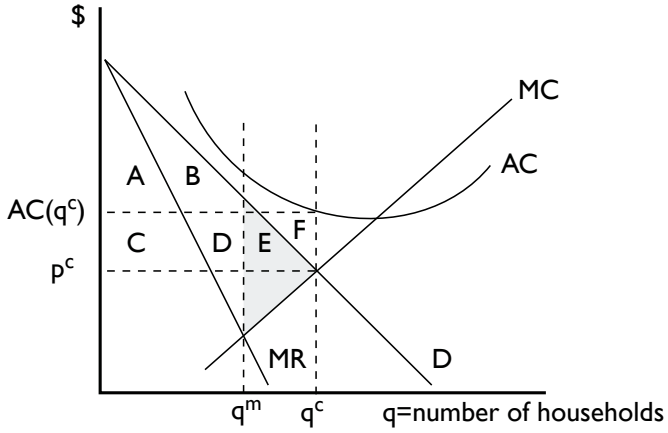
(b) The monopoly would maximize profits by setting MR=MC. In this case, that still causes a loss equal to C+D+E.



(c) Without a subsidy, the market will simply not exist since even a monopoly makes a loss. With a subsidy equal to C+D+E, the market will exist and it will generate consumer surplus of A+B+C+D. Area E represents some additional costs not justified by demand, but it is much smaller than A+B so there is a welfare gain.

(d) For clarity, there is a second graph below. At the monopoly solution from (c), there is deadweight loss shown by the shaded area. If the government increased the subsidy to C+D+E+F and combined it with a mandate that the firm produce the competitive quantity q^c and charge the competitive price p^c, this deadweight loss would be eliminated. The consumer surplus is now a quite large area A+B+C+ D+E (plus the tiny tiny triangle above E), which again needs to be weighed against some added costs F. But since F is smaller than A+B, this again increases total welfare.

It should be noted that if the government cannot perfectly measure q^c, there may be a difficult regulatory principal-agent problem here, and it may take some additional and unwelcome costs to solve it.



(e) Two answers are possible here. The first is to say that since the Smith family buys the Internet service, any consumer surplus they receive is internal to the transaction and thus does not qualify as an externality. The second is to say that Skype and WOW are networked goods, so there may be a positive direct network externality by adding the Smiths to the user base. This would accrue to other users, not to the Smiths.