

ECON 224, Professor Hogendorn

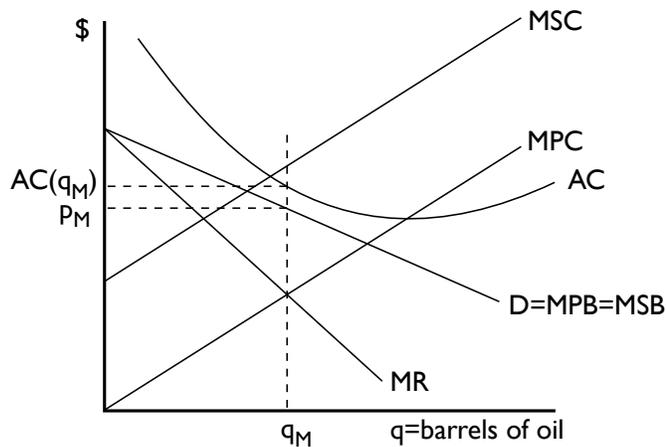
Problem Set 3 Answers

1. *Arctic_a.*

- (a) Since there is no regulation or other intervention in this market, it will just operate where supply (marginal private cost) equals demand (marginal private benefit). This is the left hand vertical quantity in the diagram.

Private consumer surplus is area $A + B + C$. Private producer surplus is area $E + F + G$. The total amount of external pollution cost is $B + C + D + F + G$. Deadweight loss is area D .

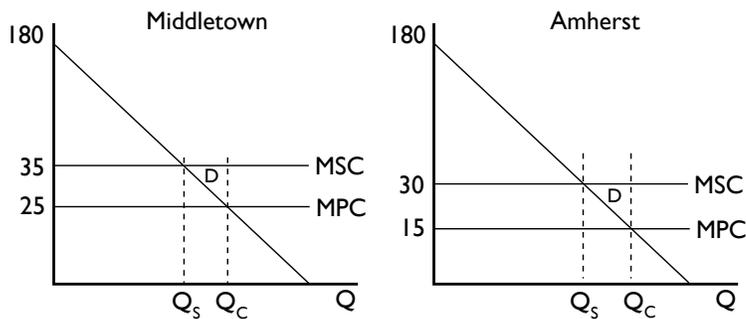
- (b) If the market is completely shut down, then all the private gains from trade, $A + B + C + E + F + G$ are lost. But there is also no pollution, so there is a gain of $B + C + D + F + G$. If we add this up, there is a net loss of $A + E - D$. Given how the graph is drawn, it appears that the private gains $A + E$ outweigh the deadweight loss D , so shutting down this market is not a good idea. In general, shutting down any market is not as good a policy as regulation to shift output to the level where marginal social cost equals marginal social benefit. In this diagram, the best possible policy is one which removes D but leaves $A + E$ intact.
- (c) We know that it is possible to make an operating profit from this market just because the demand curve is higher than the supply curve for some quantities. But fixed costs may be very high, so when we draw in the AC curve, it may be shifted up very high:



It's important that *no* portion of the AC curve be lower than demand, because apparently not even the monopoly profit maximizing price is high enough to turn a profit, and thus no firms operate in this market.

2. *CoalNaturalGas_a.*

(a) The supply and demand diagram looks like this:



(b) Middletown's MSC is shifted up 10 dollars from the MPC, giving a total of \$35 of constant marginal social cost. The social optimum is less than the competitive optimum due to the negative externality. The deadweight loss from the externality would be area *D*.

- (c) Amherst's MSC is shifted up 15 dollars from its MPC, giving a total of \$30 of constant marginal social cost. Again the social optimum is less than the competitive because of the negative externality. Although there is more external cost in Amherst than Middletown, the private cost is much lower, and the combined social cost is lower in Amherst. Thus the socially optimal quantity is higher in Amherst than in Middletown. The deadweight loss from the externality would be area *D*.
- (d) The tax would be exactly the same as the externality in Middletown, so the new "S+T" curve would exactly coincide with Middletown's MSC curve. But the new S+T curve for Amherst is not shifted up enough to offset the externality fully. Thus the new quantity produced in Amherst is too high relative to the social optimum.

