Analysing a Reduction in Pollution

- This figure illustrates the pollution reduction on the x-axis and the cost/benefit of reducing it on the y-axis.
- Private marginal benefit of reducing pollution is 0 (firms do not benefit from it).
- Social marginal costs are given by the costs that firms need to face in order to reduce pollution (first units of pollution cheaper to eliminate).
- Marginal damage = social marginal benefit of decreasing pollution. It is assumed to be flat only for illustration purposes (in general we will assume they are decreasing: more valuable when there is more pollution).

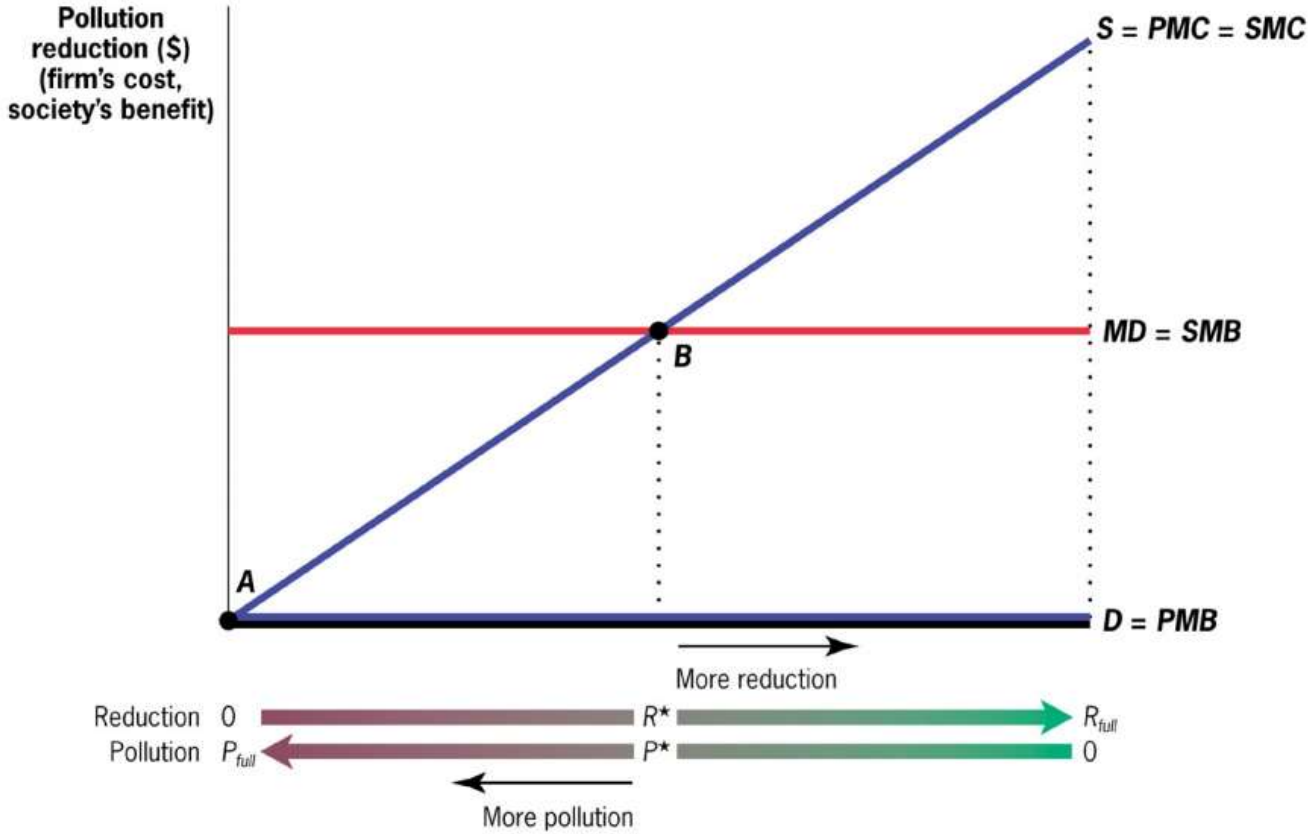

Figure 5.8 The Market for Pollution Reduction
Gruber: Public Finance and Public Policy, First Edition

Price and Quantity Regulations with Heterogeneous Marginal Costs

- If there are multiple firms with heterogeneous marginal costs of reducing pollution, the implications of quantities and price regulations can be very different.

- In the diagram, firm A faces lower marginal costs than firm B at every level of pollution. Indeed, they can reduce pollution by 50 units without bearing any cost.

- Given that for one of the firms is cheaper to reduce pollution, policies that force all of them to reduce pollution by the same amount are not efficient.

- With a plain marginal damage curve like the one in the figure, we can set a tax equal to $100 and we will reach the social optimum with each firm reducing pollution according to their marginal costs: firm A = 150 and firm B = 50.

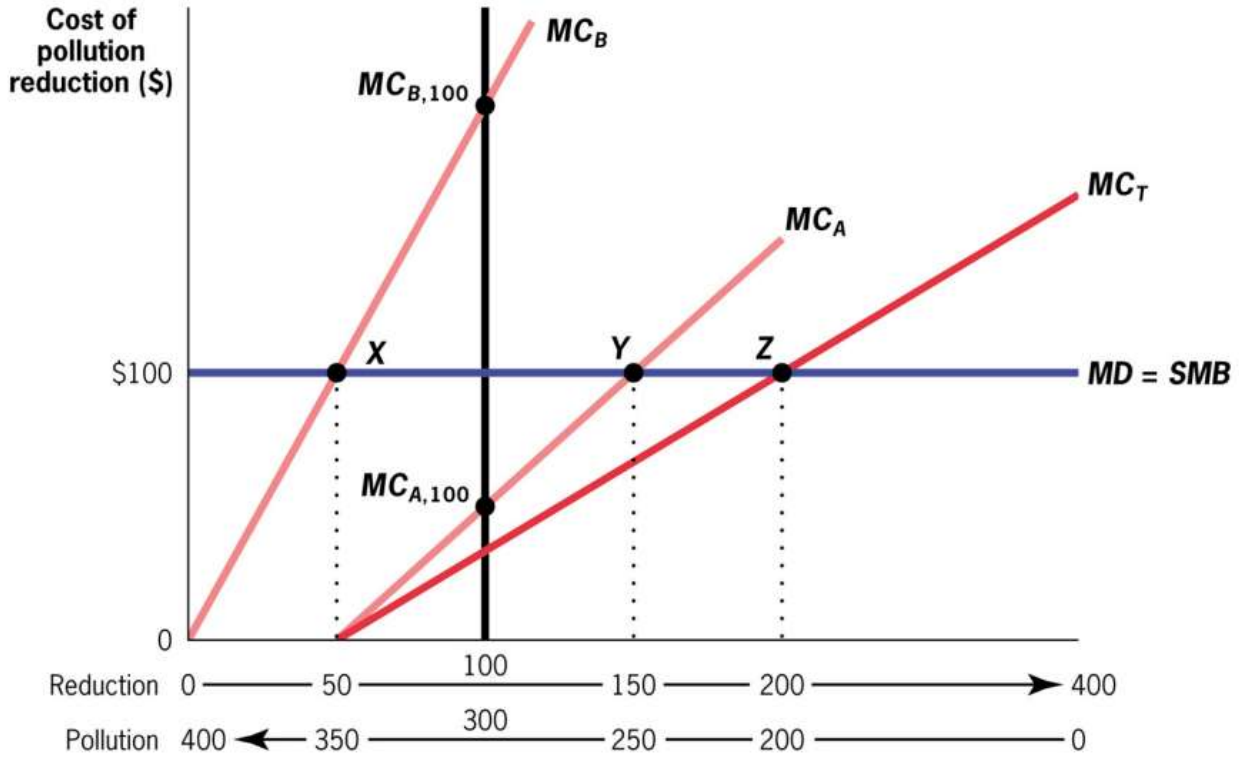

Figure 5.9 Pollution Reduction with Multiple Firms
Gruber: Public Finance and Public Policy, First Edition

Price and Quantity Regulations with Uncertainty on Marginal Costs

- Let's relax now the assumption of a plain marginal damage function.
- A decreasing marginal damage function reflects the fact when pollution is high, reductions are more valuable than when pollution is low.
- If we do not know the marginal costs of reducing pollution, then the efficiency of quantity or price regulation will be given by the slope of the marginal damage curve.
- If the marginal damage curve is very flat, price regulations are more efficient.
- If the marginal damage curve is very steep, quantity regulations are more efficient.

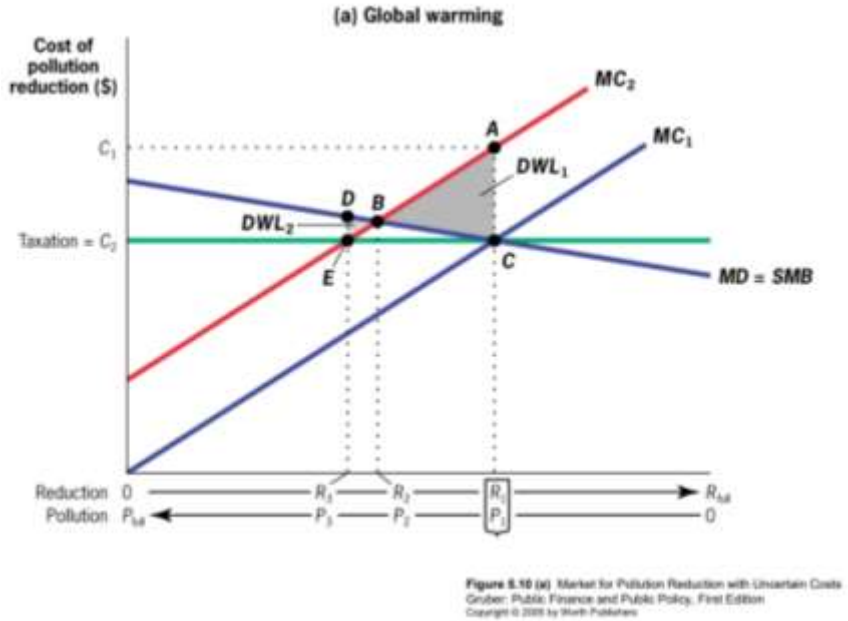

Figure 5.10 (a) Market for Pollution Reduction with Uncertain Costs
Gruber: Public Finance and Public Policy, First Edition

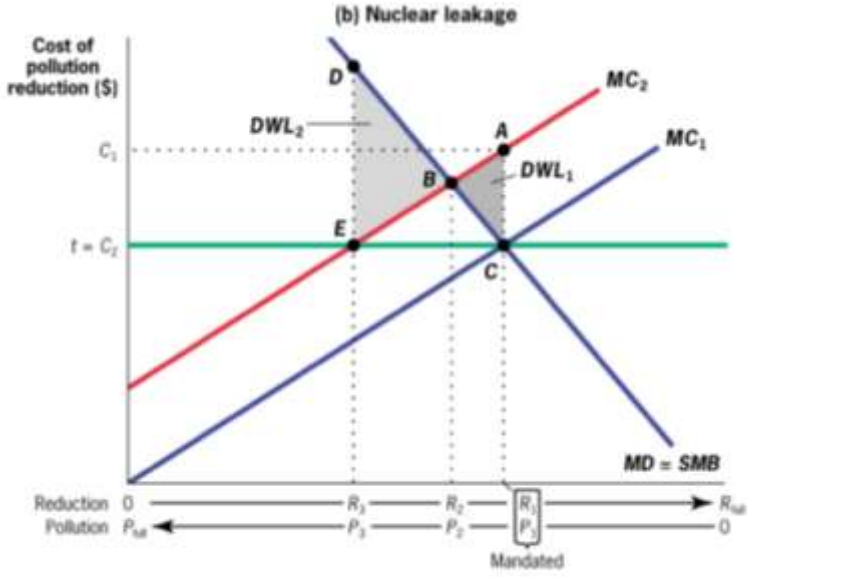

Figure 5.10 (b) Market for Pollution Reduction with Uncertain Costs
Gruber: Public Finance and Public Policy, First Edition