The Equimarginal Principle of Cost Effectiveness

To minimize the total cost of abating pollution by a given level, allocate abatement among multiple sources such that marginal costs of abatement are equalized.

We can look at an example to show the equimarginal principle: $MC_a=MC_b=...$ across all plants (subscripts a and b denote different plants).

Let a firm have two plants: Plant A and Plant B. The table below shows marginal abatement costs (MACs) of reducing pollution in the two plants.

Quantity of Emission Reduction, units	MAC of Plant A $ per unit	MAC of Plant B $ per unit
1	0.60	0.70
2	0.65	0.75
3	0.70	0.80
4	0.80	1.00
5	0.90	1.15
6	1.00	1.35

According to the equimarginal principle,

a. if total targeted reduction of pollution is 10 units, the total cost minimizing allocation of abatement should be 6 units in Plant A and 4 units in Plant B, with MACs of $1.00 in both plants. Verify that any other allocation increases the total cost.
b. If total targeted reduction of pollution is 7 units, the total cost minimizing allocation of abatement should be 4 units in Plant A and 3 units in Plant B, with MACs of $0.80 in both plants.
c. We can tabulate (see below) the cost-effective MAC schedule of this firm, for all levels of emission reduction. If these were the only two plants in the industry that emitted the pollutants, we would use the following schedule as the MAC (instead of MAC of Plant A or that of Plant B) in a MAC-MD model of pollution.
d. The cost effective allocation of a given level of emission reduction is achieved when MACs of all sources (polluters) are equalized for that level of reduction. In other words, remember the equimarginal principle of cost effectiveness.

Quantity of emission reduction	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Cost-effective MAC, $	0.60	0.65	0.70	0.70	0.75	0.80	0.80	0.90	1.00	1.00	1.15	1.35
Allocated to Plant	A	A	A (B)	B (A)	B	A (B)	B (A)	A	A (B)	B (A)	B	B

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