# Lecture # 19 – Public Goods

I. Public Goods

- <u>Public goods</u> are goods that can benefit everyone, and from which no one can be excluded.
- Two characteristics:
  1. <u>non-rival</u> -- one person's enjoyment or consumption of the good does not prevent others from using it.
  2. <u>non-excludable</u> -- people cannot be prevented from using the good.
   - Thus, it is difficult to collect money for the good.

II. Efficient Allocation of a Public Good

- Because public goods can be enjoyed by everyone, we need the summation of each individual's marginal benefit.
 - A *vertical summation* is used, since the goods are non-rival
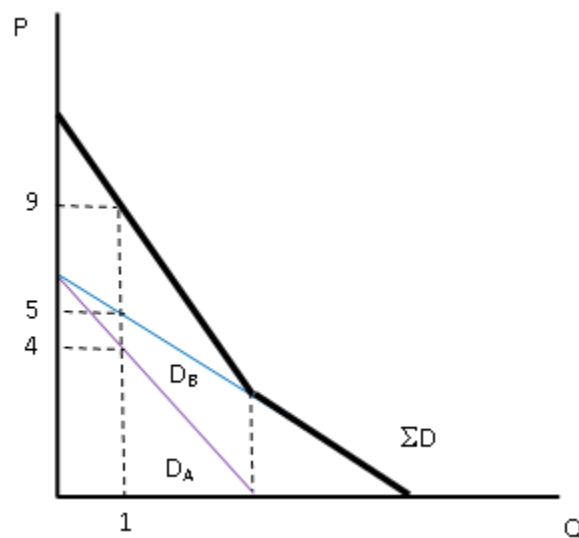
- In the figure above, D_A (purple line) represents the demand curve for person A, and D_B (blue line) is the demand curve for person B.
  - One unit of the public good is worth $4 to person A, and $5 to person B.
  - Since both can enjoy the good at the same time, the total marginal benefit of one unit of the good is $9.
    - We get this by summing vertically -- adding A's valuation on top of B's.
    - The dark line represents the combined demand.
      - In this case, with just two people, once A's valuation of the good goes to 0, only B's demand matters.

o   Contrast with private goods, for which we use *horizontal summation*.

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1   ------------------------------- ΣD

  D_A D_B

2   4   6   Q
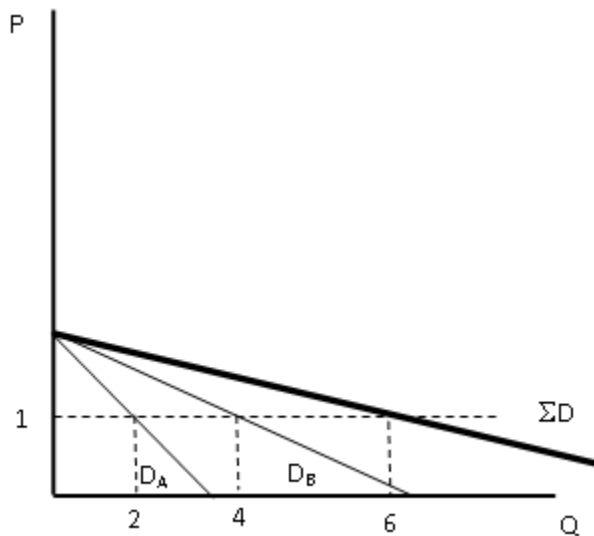
- In the figure above, D_A represents the demand curve for person A, and D_B is the demand curve for person B.
- Here, each person needs to have their own unit of the good. They cannot share.
  - At a price of $1, person A wants 2 units of the good, and person B wants 4 units.
  - Thus, we need a total of 6 units at a price of $1.
  - We get this by adding the quantity demanded of each person across to get the darker black line.
- The efficient allocation is where the sum of the marginal benefit curves equals marginal cost.
- However, both characteristics of a public good keep us from getting to the efficient solution. First, consider non-rivalness.
  o   Since each individual is concerned with his or her own marginal benefit, underprovision results.
  o   This results from the non-rival nature of a public good. When deciding how much of a public good to purchase, each person considers their own benefits. However, they do not consider that their purchase also benefits others.

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ΣD

MC

D$_A$

D$_B$

Q$_B$ Q*

Q
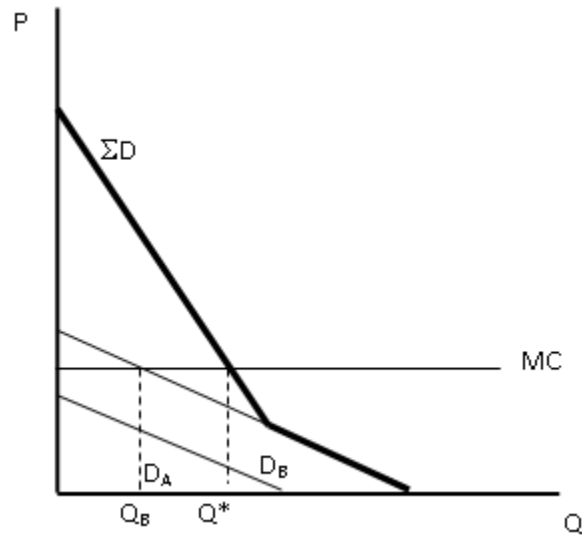
- o The above diagram illustrates the problem. Because the MC of the good is above person A's demand, person A is unwilling to provide any of the public good.
  - Person B is willing to provide some (Q$_B$).
  - However, this is less than the efficient amount (Q*), which is where MC = ΣD.
- o This is because each individual only cares about the benefit that they get from purchasing the good. They don't consider benefits to others.
  - Efficient provision: ΣMB = MC.
  - Private market provision: MB = MC.
    - But ΣMB > MB. Thus, the result is that ΣMB > MC.
      - So in the private market, we have *underprovision*.
    - Because individuals do not provide enough of a public good on their own, government intervention is necessary.

- The following numerical example illustrates
  - Consider a lake with three homes along a polluted lake
  - Each of the homeowners is willing to pay a certain amount to clean up the lake

	Marginal willingness to pay ($ per year)				
Q	Homeowner A	Homeowner B	Homeowner C	Total	MC
1	110	60	50	220	55
2	85	40	40	165	60
3	70	20	30	120	75
4	55	10	20	85	85
5	45	0	10	55	110
6	30	0	5	35	140
7	15	0	0	15	180

  - Each cleans up as long as MB ≥ MC for them. 3 units of pollution are cleaned up.
    - A willing to pay for 2 units of cleanup
    - B willing to pay for 1 unit of cleanup
    - C won't pay for anything on their own
  - Efficient solution is where ΣMB = MC
    - This would be where 4 units of pollution are cleaned up.
- The above inefficiency occurs because of non-rivalness. Non-excludability leads to a second problem: the free rider problem:
  - A <u>free rider</u> is a consumer or producer that benefits from the actions of others without paying.
    - Even if we could come up with a way to overcome the non-rival problem by sharing the cost of a public good, we still need a way to ensure that everyone pays their share. The ability of people to free ride makes this difficult.
    - Because of the free rider problem, public goods are usually provided by the government, which levies taxes to pay for the goods.
    - The free rider problem also makes it difficult to determine how much value any one individual places on a public good.
      - Unfortunately, as we know from the last lecture, majority rule voting may not help us here.

- o What can be done about the free rider problem?
  - Compulsory provision – the government can collect taxes from everyone to make them pay a share of the cost.
  - Social pressure – pressure people into contributing "voluntarily."
    - Most likely to work for small groups (e.g. stores in a mall contributing to a security guard's salary).
  - Mergers – if individuals combine into a single entity, the free rider problem is no longer relevant.
  - Privatization – if exclusion is possible, the free rider problem no longer exists.