Principles of Economics

Distorting and Undistorting Competitive Markets

Externalities and the Plan

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Back to Our Pollution Problem…

- Now we have three things happening in this marketplace:
  - Value to consumers:
    - $TV = Q \times (P_{d0} + P_d)/2$
- Cost to producers:
  - $TC = Q \times (P_{s0} + P_s)/2$
- Externality cost to Cloud-Cuckoo Landers:
  - $XC = -(P_x)Q$
  - $P_x = 30$

What Would Our Benevolent, Omniscient Central Planner Want to Do?

- Now we have three things happening in this marketplace:
  - Value to consumers:
    - $TV = Q \times (P_{d0} + P_d)/2$
    - $TV = Q \times (P_{d0} + P_{d0} - bQ)/2$
  - Cost to producers:
    - $TC = Q \times (P_{s0} + P_s)/2$
    - $TC = Q \times (P_{s0} + P_{s0} + aQ)/2$
  - Externality cost to Cloud-Cuckoo Landers:
    - $XC = -(P_x)Q$

What Would Our Benevolent, Omniscient Central Planner Want to Do? II

- Now we have three things happening in this marketplace:
  - Value to consumers:
    - $TV = Q \times (P_{d0} + P_d)/2$
    - $TV = Q \times (P_{d0} + P_{d0} - bQ)/2$
  - Cost to producers:
    - $TC = Q \times (P_{s0} + P_s)/2$
    - $TC = Q \times (P_{s0} + P_{s0} + aQ)/2$
  - Net value to producers and consumers
    - $NV = Q \times ((P_{d0} - P_{s0}) - (a + b)Q/2)$
    - $NV = (P_{d0} - P_{s0})Q - (a + b)Q^2/2$
  - Externality cost to Cloud-Cuckoo Landers:
    - $XC = -(P_x)Q$

What Would Our Benevolent, Omniscient Central Planner Want to Do? III

- Net value to producers and consumers
  - $NV = (P_{d0} - P_{s0})Q - (a + b)Q^2/2$
- Externality cost to Cloud-Cuckoo Landers:
  - $XC = -(P_x)Q$
- Total value to producers, consumers, and external Cloud-Cuckoo Land pollution sufferers:
  - $TV = (P_{d0} - P_{s0} - P_x)Q - (a + b)Q^2/2$

What Would Our Benevolent, Omniscient Central Planner Want to Do? IV

- Net value to producers and consumers
  - $NV = (P_{d0} - P_{s0})Q - (a + b)Q^2/2$
- Externality cost to Cloud-Cuckoo Landers:
  - $XC = -(P_x)Q$
- Total value to producers, consumers, and external Cloud-Cuckoo Land pollution sufferers:
  - $TV = (P_{d0} - P_{s0} - P_x)Q - (a + b)Q^2/2$
- Maximize total value by taking a derivative:
  - $0 = d/dQ(TV)$
  - $0 = d/dQ((P_{d0} - P_{s0} - P_x)Q) + d/dQ(-(a + b)Q^2/2)$

What Would Our Benevolent, Omniscient Central Planner Want to Do? V

- Maximize total value by taking a derivative:
  - $0 = d/dQ(TV)$
  - $0 = d/dQ((P_{d0} - P_{s0} - P_x)Q) + d/dQ(-(a + b)Q^2/2)$
  - $0 = (P_{d0} - P_{s0} - P_x) - (a + b)Q$
- Total value is maximized when:
  - $Q = (P_{d0} - P_{s0} - P_x)/(a + b)$

What Would Our ~~Benevolent, Omniscient Central Planner~~ Market Want to Do?

- We want:
  - $Q = (P_{d0} - P_{s0} - P_x)/(a + b)$
- But what is our equation for the equilibrium quantity when we impose a per-unit tax of T on the market?

What Would Our ~~Benevolent, Omniscient Central Planner~~ Market Want to Do? II

- We want:
  - $Q = (P_{d0} - P_{s0} - P_x)/(a + b)$
- But what is our equation for the equilibrium quantity when we impose a per-unit tax of T on the market?
- Yes! It is:
  - $Q = (P_{d0} - P_{s0} - T)/(a + b)$