Public Finance

Andrei M. Gomberg

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# EXERCISE 3: Externalities

There are 2 companies: a power station and a fishery. The power station produces electricity $x$ using one input $z$ (labor) according to the technology

$$x = f(z) = \sqrt{x}$$

The fishery produces fish, $y$, using the same input $z$ according to the technology

$$y = g(z, x) = 4\sqrt{z} - x^2$$

where $x$ is the level of output of the power station. Assume that $x, y, z$ are traded in competitive markets at constant prices (you may assume that all prices are equal to 1).

a) Specify the game both companies play (assuming no cooperation between companies is possible).

b) Compute equilibrium level of output of each producer

c) What are the efficient output levels?

d) What Pigouvian tax could be imposed by an omniscient government to achieve efficiency?

# Bargaining

There are two individuals, $A$ and $B$, who have to come to an agreement about sharing a joint surplus $S = \$100$. The bargaining procedure they use is as follows: $A$ makes an offer, $B$ chooses to accept or reject it; if the offer is accepted, they share the surplus as proposed, if the offer is rejected $B$ makes a counteroffer which can be accepted or rejected by $A$. If this offer is accepted, they share the surplus as proposed, if the offer is rejected then both individuals get 0. Individuals are impatient: that is each individual's utility gets discounted by $0 < \beta_i < 1$ if he has to go through an extra round of offers (the smaller the $\beta_i$ the more impatient is the individual $i$).

a) What is the bargaining game individuals play (define the game and draw the game tree of its extended form)?

b) What is the subgame-perfect equilibrium of the game? What are the equilibrium payoffs?

c) How does your answer change if after the second-period rejection $A$ gets another chance to make an offer (the game in this case ends after any response by $B$)?