

HOMEWORK 4: Tradable Permits and Public Goods

Due: Monday, February 16th, 2015

LEARNING OBJECTIVE

- Tradable permits. By defining property rights, the social planner can create missing markets that can sustain a competitive equilibrium as Pareto optimal.
- Like externalities, public goods are another example of a market failure in which the centralized allocation does not equal the decentralized allocation.

INSTRUCTIONS

Carefully read the questions before answering. Make sure your pages are in order and stapled together. Your work should be clear and easy to follow. When prompted, make sure that you have explained your answers completely.

QUESTION

1. Continuation from Homework 1c. As we discovered, Pigovian taxes were required to ensure that firm 1's negative externality on firm 2 was internalized or that the decentralized allocation equaled the centralized allocation. Instead of Pigovian taxes, assume that the social planner assigns firm 2 the right to an unpolluted river. This assignment of rights creates a new market for the right to pollute. Let p^f be the price of the right for firm 1 to pollute one unit and the quantity of rights demanded by firm 1, y_1^{12} , must be equal to the number of units of pollution created, y_1^1 . Firm 2 now supplies quantities of pollution rights, \hat{y}_1^{12} at price p^f . Remember that the new market for permits must clear in the decentralized case such that $y_1^{12} = \hat{y}_1^{12} = y_1^1$. Determine the price of the permits to ensure that the decentralized allocation equals the centralized allocation. You only need to show the decentralized allocation with the permit market, referring back to previous work as necessary.
2. There are two graduate students in the South Seas, A and B , that consume only coconuts. They use the coconuts for two purposes: either they consume them for food, or they burn them in a public religious sacrifice (The students believe that this sacrifice will help their comprehensive exam performance). Suppose that each student $i = A, B$ has an initial endowment of coconuts, $w_i > 0$. Let $x_i \geq 0$ be the amount of coconuts that the student consumes, and let $g_i \geq 0$ be the number of coconuts the student gives to the public offering. The total number of coconuts contributed to the public offering is $G = g_A + g_B$. Student i 's utility function is given by
$$U_i(x_i, G) = x_i + a_i \ln(G)$$
where $a_i > 1$.
 - a. Compare the centralized and decentralized allocations of coconuts at the public offering. Note: the decentralized allocation requires the use of Kuhn-Tucker's for $g_i \geq 0$.
 - b. Given what you found for the decentralized allocation in a., who will free-ride in this problem and why?.