

Homework Assignment #2: Energy Economics 399

Due: Friday, February 6

1. Consider an economic program that affects people of different income levels as follows:

	Income before program	Income after program
Poorest 20% :	\$ 12,338	\$ 11,674
Next 20% :	\$ 30,295	\$ 29,594
Next 20% :	\$ 50,709	\$ 49,591
Next 20% :	\$ 78,922	\$ 78,495
Richest 20% :	\$168,302	\$172,941

- Does this program satisfy the Kaldor-Hicks Potential Pareto Criterion?
- Assume that it in order to transfer money from the wealthy to the poor costs 20% of the total amount transferred. Would this program satisfy the Full Compensation Criterion?
- Does full compensation seem to be a reasonable public policy in this case?
- Does this program satisfy the Willig/Bailey test?
- Using Feldstein's equation for determining distributional weights, what should the weights be for each income group?

$$F(y) = (y/y_{avg})^{-d} \quad \text{Assume } d = 1$$

- Using the weights calculated in part e., is this a good program?
 - Based on your answers in the previous parts, would you recommend this program? Would you make any conditions for your support?
2. Suppose that in order to combat global warming, we are considering instituting a policy that will cost \$1,000 this year in order to prevent \$5,000 in damages in 60 years.
- At a real discount rate of 3%, is this a good policy?
 - Now suppose we are unsure about the future so that there is a 80% chance of climate change leading to \$0 in damages in 60 years, a 20% chance of climate change leading to \$25,000 in damages in 60 years. At a real discount rate of 3% is this a good policy?
 - Now suppose we are risk averse so that $U = I^{.5}$. Suppose income today, absent any policies regarding climate change, is \$40,000 and that real income in 60 years, absent the effects of climate change, to also be \$40,000. If a cost of \$1,000 today will avert \$5,000 in damages in 60 years with certainty, is this a good policy at a real discount rate of 3%?
 - Again supposing risk aversion and incomes of \$40,000 now and in the future, if the benefits of climate policy are uncertain as in part b., is this a good policy at a 3% real discount rate?
 - Repeat part c. assuming a future real income of \$70,000.
 - Repeat part d. assuming a future real income of \$70,000.

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3. Suppose the demand for a depletable good like oil is $P = 8 - .4q$ in each period. Using this demand function it can be shown that the consumer's total WTP for the good is: $WTP = 8q - .2q^2$ in each period. Assume the marginal cost of extracting oil is constant over time and production and $MC = 2$.
- a. Suppose that the producer of the oil is also the final user. If there is an unlimited amount of oil, how much is produced and consumed in each period?
 - b. Now suppose that there is a 2-period world and that the total endowment of oil is 20 units. The rate of time preference (discount rate) = 5%. How much oil is consumed in each period?
 - c. Instead of the producer being the final user now assume that a monopolist owns the oil well. If there is an unlimited supply of oil, how much oil is produced in each period and at what price is it sold?
 - d. Now again assume that a monopolist produces the oil over two periods but that the total amount of oil is 20 units. How much oil will be sold in each period, what will be the price, what will be the monopolist's profits, and how much consumer surplus will the consumer realize?
 - e. Again assuming that there are 20 total units of oil, if there is free, unlimited access to the oil in each period, how much oil is produced in each period, at what price is it sold, what will be the firms' profits, and how much consumer surplus will the consumer realize? Compare the social welfare of monopoly to competition.
 - f. What is meant by the term "rent seeking" and how does it apply here?
 - g. Finally, suppose that there are alternative energy source to oil available at a marginal cost = 6. How might this change the long-run equilibrium production and consumption of oil?
 - h. In two separate graphs, graph the situations in part a. and part c. In your graph, clearly identify price, quantity, and any areas of producer and consumer surplus.