ECON4910 Environmental Economics — Seminar 6

April 29, 2014

Problem 1

Consider the following scenario: Mineral reserves are expected to lie beneath a wilderness area. The total value of the mineral reservoir is estimated to be 3.3 billion USD, but extracting them would destroy the wilderness area. Currently, the wilderness area is so remote that no one visits it (hence its economic value is zero). However, it will be accessible in the future due to the opening of a new train station in the vicinity. Then, people may discover that there are beautiful waterfalls in the area and visits will generate an economic value of 4 billion USD. Unfortunately, the chances of this happening are slim: with 75% probability, the wilderness does not offer any sights that would attract visitors.

Model this as a two-period problem, and say that the mine (if developed) generates a surplus of 0.3 billion in the present (period 1) and a surplus of 3 billion in the remaining future (period 2). If the mine is not developed in the first period, the surplus of that period is lost, but the remaining surplus remains.

(a) When the option is to develop the mine now or never, what should one do?

(b) If the value of the wilderness area becomes known after the first period, should one develop now or defer the decision?

(c) How does you answer to the previous question change when the mine generates almost all revenues now and only $\frac{1}{3}$ billion USD in the future?

Problem 2

Now consider a continuous time, infinite horizon version of a similar problem. The development of the mine would generate an instant profit of π. The wilderness area currently generates an instantaneous value of v, but this is expected to grow at rate a. The discount rate is r.

(a) Why could it be reasonable to expect that the value of wilderness grows with time?

(b) Using standard cost-benefit analysis, should the mine be developed when $\pi > v$ and $a = 0$?

(c) Suppose $\pi = 2v$. Find the rate $\bar{a}$ above which the mine should not be developed.

Problem 3

As an exercise for this year's exam, try to solve last year's exam. Address only question 1 (really try to write an essay in a one-hour time limit) and question 2.1-2.5.