

## EXERCISES AND PROBLEMS WEEK 1

### 1. Property regimes (Based on Cohen and Weitzman 1974.)

Pescado is a small town with 5000 fishers. Because they have little education, the fishers of Pescado cannot do anything else than fish to make a living. Next to town, there are only two lakes where fishers can catch fish, lake Tilapia and lake Loyola (named after a Jesuit missionary who lived there in a time when fish scarcity was not an issue).

The aggregate output function lake Tilapia is given by

$$y_T = 12x_T - 2x_T^2,$$

while that of lake Loyola is

$$y_L = 7x_L - \frac{1}{2}x_L^2,$$

where  $x_T \times 10^3$  and  $x_L \times 10^3$  denote the respective number of fishers on lakes Tilapia and Loyola, and  $y_i$  denote the total catch in thousand of pounds of fish. The price of one pound of fish is fixed and equal to 1.

- (1) What will be the distribution of workers between the lakes in an regime of *open-access*? (Explain intuitively how you arrive at this distribution. By open-access, we wish to represent a situation equivalent to an arbitrarily large number of fishers.)
- (2) What will be the distribution of fishers between the lakes in a regime of exclusive ownership? (Suppose that each lake is exploited by a different owner who hires the fishers and takes wages as given.)
- (3) Assuming no transaction costs, which property regime is the most efficient? Is it the one preferred by workers? Explain?
- (4) Suppose now that excluding access to a lake requires a fixed cost of 3000. Which property regime is efficient? Why?
- (5) What would the equilibrium be if the fixed cost of exclusion were 5000 instead of 3000? Is exclusive ownership efficient?

### 2. Rents, heterogeneous land and labor supply elasticity (Adapted from Hartwick and Olewiler, ch 3.)

Suppose that total labor supply in the rural sector is elastic and given by  $S(w)$  with  $S'(w) \geq 0$ , where  $w$  is the wage rate paid to rural workers.

- (1) Provide a graphical characterization of the equilibrium assuming three plots of land of differing quality.
- (2) Discuss the fundamental differences between returns from land and physical capital?

- (3) What happens when a fourth plot of land is brought into use after being cleared? Compare and discuss the cases of elastic, perfectly elastic, and inelastic supplies from the perspective of land owners and laborers.

**3. Property regimes and specific investments** (Inspired by Karp JDE (2005))

Suppose that the exploitation of a plot land requires two types of inputs: labor and capital. Capital is a specific investment in the sense that it cannot be used anywhere else than on the plot of land (e.g. a barn to store the grain, a fence to keep the cattle from straying, an irrigation canal, a water reservoir, a road to access the land, etc). Such an investment increases the productivity of labor.

Discuss intuitively how the presence of such productivity-enhancing specific investments should affect the comparison of output between a free-access and an exclusive ownership regime. Differentiate between capital investment with excludable benefits, such as a storage barn, and those that are non-excludable, such as an irrigation system. (NB No graphic or equation is required here. Just provide some economic arguments.)