Econ4925 – Seminar 5

Fish

Consider a fishery where the harvest per fishing boat is given by the following harvest/production function:

$$h = kE^{-\alpha}S^{\beta}$$

where E is the total number of fishing boats and S is the stock of fish. Here: $k > 0$, $\alpha \in (0,1)$, $\beta \in (0,1)$.

1. Derive the aggregate cost function for the fishery under the assumption that the cost of effort per fishing boat is w.

2. Show how total catch H depends on S in an open access fishery with zero profit.

3. Discuss under which conditions the fish stock may become extinct.

4. When the open access equilibrium has a positive stationary resource stock, show how this stock depends on the exogenous parameters.

5. Derive the conditions for the social optimum, in particular for the steady-state with a positive resource stock when such a steady-state exists.

Trees

Consider the standard model of a commercial forest. Assume that there is a tax/subsidy scheme such that the growth of the forest is subsidized at a rate s while a decline in the forest is taxed at the same rate s. Call the present value for the forest owner (from planting to cutting time T) of such a subsidy/tax scheme $N(T)$.

1. Show that $N(T)$ is positive.

2. What does this imply for the value of land when used as a forest?

3. It can be shown that:

$$\frac{N'(T)}{N(T)} > \frac{re^{-rT}}{1-e^{-rT}}$$

What does this imply for the optimal time T of cutting a tree?