ECON 4925 – fall 2016

Seminar 5 – ECON 4925 Resource Economics – October 31, 2016

**Problem 1 – Fish**

Consider a fishery facing an exogenous price p per unit fish. In addition to the social surplus from the fishery, the government attaches a social value $v$ per unit of the fish stock at any time. Suppose that there are $n$ identical vessels, each with a cost function $c(x(t), S(t)) + k$, with $k$ a (small) fixed cost, $x(t)$ the harvest rate per vessel and $S(t)$ as the stock of fish in sea at $t$. The cost function is increasing and convex in $x$, decreasing in $S$.

a) Set up the social (infinite horizon) optimization problem for this case, with $(x, n)$ as control variables and $S$ a state variable, when the rate of discount is $r$.
b) Derive the long-run (steady-state) solution for this problem and try to derive some conclusions as to how the steady-state solution depends on the parameters of the model.
c) Derive the landing tax on fish that will make the open access equilibrium equal to the social optimum.

**Problem 2 – Forest**

Consider a privately owned forest. The owner has sold the land the forest is on for a given amount of money W. The contract specifies that w (positive and lower than W) is paid upon signing the contract, while the rest W-w is paid when the new owner takes over the land. The land is not taken over until the timber is harvested, and the old owner is free to choose the date of harvesting.

a) Derive the harvesting date that is optimal for the old owner, and how it depends on W and w.
b) Compare this with the date that would be optimal if the land had not been sold.
c) How do both dates depend on the discount rate?