

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Exam: **ECON4925 – Resource economics**

Date of exam: Thursday, December 4, 2008

Grades are given: January 6, 2009

Time for exam: 2:30 p.m. – 5:30 p.m.

The problem set covers 2 pages

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

The exam consists of two problems. They count as indicated. Start by reading through the whole exam, and make sure that you allocate time to answering questions you find easy. You can get a good grade even if there are parts of problems that you do not have time to solve.

Problem 1 (2/3)

Consider a market for an exhaustible resource with negative climate effects produced by competitive producers and demanded by two groups of countries with demand functions $k_A p_t^{-\varepsilon}$ and $k_B p_t^{-\varepsilon}$ for group *A* and *B*, respectively. The resource is available in a known total amount S_0 with unit extraction cost equal to zero. There exists a perfectly substitutable backstop product available at unit cost c . We take the interest rate to be given as r , constant over time.

1. Consider the problem of determining the equilibrium price path for the resource given the total demand $(k_A + k_B) p_t^{-\varepsilon}$ and the other parameters mentioned above. Find the length of the extraction period T (or an equation uniquely determining T).
2. Suppose hypothetically that a climate policy is adopted from $t = 0$. Two measures are simultaneously put into effect: (1) the *B* group of countries ban all use of the resource, and (2) a technological breakthrough lowers the cost of a perfectly substitutable and climate neutral backstop product to c^* , where $0 < c^* < c$. Determine the length of the extraction period T^* in this hypothetical scenario. Use the assumptions $\varepsilon=2$, $k_B=3k_A$ and $c^* = \frac{1}{2} c$. to compare T^* with T .
3. Comment upon the climate effect of each of the two measures in 2 and their combined effect, compared with the extraction profile determined in 1. Consider also whether the climate effect could be influenced by taxes, e.g. a tax on each unit of the resource extracted.

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4. Find expressions for the value at $t=0$ of the resource stock S_0 in the extraction scenarios given in 1 and 2.
5. Assume that instead of being zero throughout, the extraction cost is a non-decreasing function of the remaining stock and becomes very high when the remaining stock approaches zero. Discuss informally the implications of this for the climate effects of the extraction profiles determined in 1 and 2.

Problem 2 (1/3)

Explain the Faustmann Rule in commercial forestry.

Please do not forget the periodic course evaluation for ECON4925, which you will find on the website for the course. The deadline is December 15.