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ECN 371 - Environmental Economics
09:00-12:00 - May 19, 2008

A1: No books except English dictionary, no other aiding tools.
This exam consists of 4 questions, for a total score of 100 points.
All questions are to be answered. You may answer in English or Norwegian.

Question 1 (20 points)

(a) Show that the *basic equation of monitoring and enforcement* is $p = \dfrac{U_n - U_c}{S}$, where
   p is the monitoring probability, U_n and U_c denote the respective payoffs of noncompliance and compliance with the rules, and S denotes the penalty issued when monitored and found in noncompliance. **(10 points)**

(b) Based on the expression in (a) briefly discuss difficulties with Gary Becker's "hang the prisoner with probability zero" proposition, and suggest ways of solving the problems of this proposition. **(10 points)**

Question 2 (20 points)

Transaction costs and agent perceptions regarding how decisions are made in various settings are important for the selection of policy instruments.

(a) Explain what is meant by *motivational structures*, and discuss briefly possible implications of discrepancies between the motivational structure behind economic policies and agents' perceptions. **(10 points)**

(b) Explain what is meant by the *optimal point of instrument application*, and discuss briefly its implications for the choice of policy instruments. **(10 points)**

Question 3 (20 points)

Truthful revelation of information about agents' costs is important for the design of environmental policies when there is asymmetric information.

(a) Explain why a reverse Vickrey style $N+1$ price auction (a bidding contest where multiple contracts are awarded) makes it a weakly dominant strategy for agents to truthfully reveal their costs of supplying a service, and graphically show the information rents that agents get using this type of auctions. **(10 points)**

(b) Explain how the regulator can find the optimal emission level when agents have private information about their own costs (= the regulator does not know the agents' abatement costs), while the marginal economic costs of pollution (the MEC curve) is known using tradable emission permits. **(10 points)**

Question 4 (40 points)

Assume that in a country about one third of the gross national product comes from one sector in the economy. Most of the goods produced in this sector are exported. In this country the government is contemplating policies to reduce emissions of a nontoxic pollutant from the same sector. It is considering the following two policy alternatives to be **put in place two years into the future**:

(i) Grandfathered tradable emission permits, where existing firms are given an initial emission quota based on their emission level next year.

(ii) An emission tax, where the tax rate is to be reduced to avoid hurting the export oriented sector too much.

Representatives for the tax payer association favor the emission tax proposal, arguing that the introduction of the emission tax will allow for lowering other distorting taxes, in particular on labor income. They claim the emission tax will produce massive welfare gains as lower tax rates on labor will induce people to work more, thereby more than compensate for the losses incurred by export sector.

Representatives for the polluting industry argues against both proposals, claiming that either policy will be very harmful to the industry because it sells its products in a highly competitive international market. The industry representatives therefore suggest a system of voluntary regulations, where the industry agrees to cut its emissions by half within ten years if the government promises not to introduce other regulations on the industry in the same time period.

(a) Discuss (briefly) the advantages and disadvantages of the industry proposal. **(10 points)**

(b) Discuss (briefly) the advantages and disadvantages of the two government proposals. **(10 points)**

(c) Discuss the validity of the claim made by the tax payer association about the welfare effects of the emission tax. **(10 points)**

(d) Suppose that you are called in as an advisor to the government. What changes would you recommend in the tradable emission permit system? Justify your suggested changes. **(10 points)**

Eric Nævdal (sign.)   Eirik Romstad
(external examiner)   (course responsible)