Written Exam for the B.Sc. in Economics 2009-II

Micro 3

Final Exam

June 11th, 2009

(2-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students’ self-service system.

PLEASE ANSWER ALL QUESTIONS BELOW. PLEASE EXPLAIN YOUR ANSWERS.

1. (a) Find *all* Nash equilibria in the following game

	L	R
T	$2,3$	$5,2$
B	$3,2$	$1,3$

(b) Solve the following game by eliminating strictly dominated strategies. Find all Nash equilibria of this game.

	t1	t2	t3
s1	$5,2$	$1,3$	$7,2$
s2	$5,2$	$2,4$	$2,1$
s3	$4,1$	$1,0$	$6,-1$

(c) Consider the extensive-form game represented by the game tree on Figure 1:

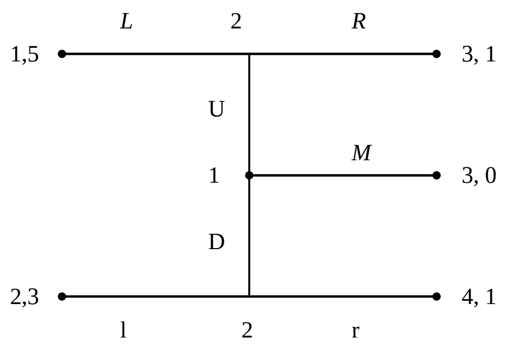

Figure 1

i. How many subgames are in this game? Find all subgame perfect Nash equilibria.
ii. Rewrite this game in normal form and find all pure-strategy Nash equilibria.
iii. Suggest an extensive form game that corresponds to the normal form you presented in ii) but differs from Figure 1. Comment.

2. Two regions of a country $i = 1, 2$ are allowed to set their own local tax, t_1 and t_2 respectively. The tax is lump sum and is imposed on the citizens living in the respective region. The citizens "vote by foot" by moving from the region with higher taxes to the region with lower taxes. Their mobility is however imperfect (because moving is associated with some costs, like getting a new job, a housing, etc.). More precisely, given t_1 and t_2, the share of people settling in region 1 is

$$s_1 = \frac{1}{2} + a(t_2 - t_1),$$

and the share of people settling in region 2 is

$$s_2 = \frac{1}{2} + a(t_1 - t_2),$$

where parameter $a > 0$ reflects the sensitivity of people to the difference in taxation (you may assume that a is sufficiently low so that both s_1 and $s_2 \in [0, 1]$). Both regions maximize their total tax collection less the quadratic cost of collecting taxes

$$U_i = t_i * s_i - \frac{t_i^2}{2}, \quad i = 1, 2.$$

(a) Assume that the regions set their tax levels simultaneously and non-cooperatively. Find the Nash equilibrium tax levels t_1^{NE} and t_2^{NE} in both regions. How do equilibrium tax levels depend on a? Provide an economic intuition to your answer.

(b) Find the levels of taxes t_1^{so} and t_2^{so} that maximize the joint payoff of the two regions. Comment on the difference between your results in a) and b).

From now on set $a = 1$ and assume that the tax setting game between the regions is repeated for infinitely many periods. The regions discount future at the rate of $\delta = 8/11$.

(c) Suggest a subgame-perfect equilibrium of this infinite game that would allow the regions to support the tax levels t_i^{so}, $i = 1, 2$ in each period (do not forget to prove that your suggested equilibrium is subgame-perfect).

3. Anna and Bo are involved in a car accident. The accident happened in such a way that there could be only two possible cases: either only Anna is guilty in the accident, or both Bo and Anna are guilty. Anna knows exactly if she is the only one guilty or if it is their joint fault. Bo does not know whether it is Anna who guilty or both of them, he only knows that she may be the only guilty one with probability 50%. The accident happened close to a surveillance camera, so if it is reported to the insurance companies of Anna and Bo, the truth will be discovered. Anna offers Bo an "on-the-place" compensation payment of either 2 or 6 (there are only those two options available to Anna). Bo can either accept or reject this payment. If he accepts, then the payment is made, and they do not report the accident to their insurance companies. If Bo rejects, the accident gets reported, and the insurance companies investigate the case. If only Anna is guilty, her insurance premium rises, incurring a cost on her of 6, and on top of it, she has to pay Bo a compensation of 5. If it is found that it is their joint guilt, there is no compensation for Bo, and the insurance premiums rise by 3 for both of them.

   (a) Complete the extensive form of this signalling game, represented on the figure below (i.e., who is the sender? who is the receiver? what are the payoffs when the t_2 type of Sender chooses SIX, and the receiver chooses a in the right information set). How many strategies does each player have, and what are they?

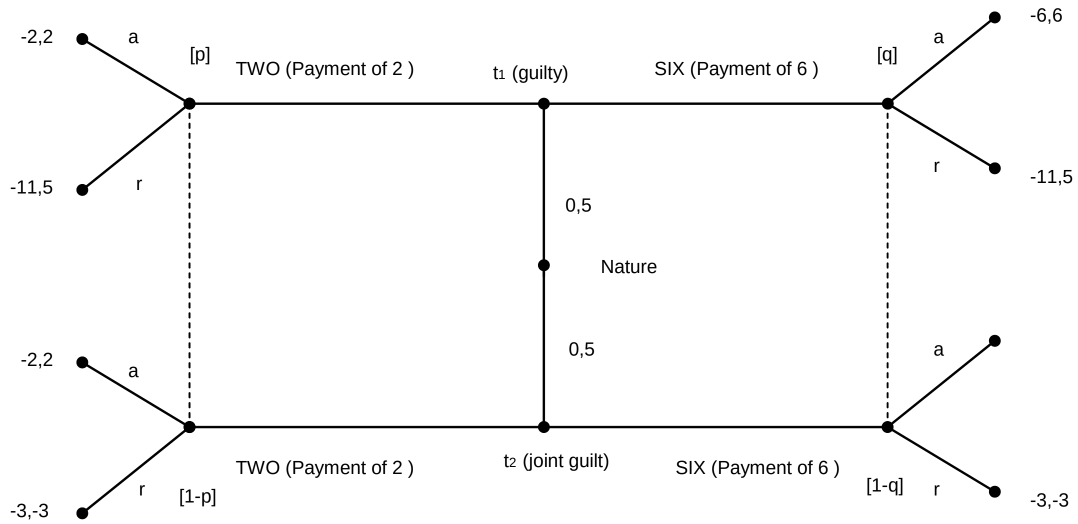

Figure 2.

   (b) Find a pooling Perfect Bayesian equilibrium of this game.

   (c) Formulate Signalling Requirement 6 (the intuitive criterion). Does the equilibrium you found in b) survive Signalling Requirement 6? Explain.

4. Torbjorn, Sven and Nikolaj are working on a project for a design competition. They are free to form groups of any size among themselves. Torbjorn and Sven are both very experienced, so if they both are in the group, the resulting project gets the first prize of DKK 3000 (no matter if it is 2- or 3-person group). If they are not working in the same group, any group of

2 persons which includes either Torbjorn or Sven gets one of the second prizes of DKK 1000. If Torbjorn or Sven work alone, each of them gets one of the 3rd prizes of DKK 500. Finally, Nikolaj is not as experienced as the others, so if he works alone, he cannot get any prize.

(a) Think of this situation as of coalitional game with transferable utilities. Write down the value of each coalition.

(b) Find the core of this game.