Written Exam for the B.Sc. in Economics, Winter 2010/2011 RE

Microeconomics B

Final Exam

Date 18/2 2011

(3-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.

Question 1

Which of the following are true in a graph of isoquants (with capital on the vertical and labor on the horizontal) assuming a given wage and rental rate.

a. All long-run cost minimizing input bundles lie on a ray from the origin.
b. (a) is true only if the production technology is homothetic.
c. All short-run cost minimizing input bundles lie on a horizontal line.
d. (c) is true only if the production technology is homothetic.
e. (a) and (c) are true.
f. (b) and (c) are true.
g. (a) and (d) are true.
h. None of the above.

Answers

If production is homothetic, the tangencies between isocosts (whose slope is always the same) and isoquants (whose slope is the same along a ray from the origin) lie on a ray from the origin. But if production is not homothetic, that's not the case. Thus (b) is true.

In the short run, capital is fixed -- which means that the short run production frontier is a slice with fixed capital. Such a slice lies on a horizontal line in the isoquant graph -- thus (c) is true.

Question 2

Consider an example of a *Principal-Agent* case, where the principal is looking for a way of making the agent behave in accordance with a given behavior. You may think of a situation where the Principal can offer a payment schedule to the agent.

a) What type of conditions must the Principal consider?
b) A specific type of payment schedule is to use a kind of profit sharing to induce a specific behavior of the agent. Describe when this is a good idea and when it is perhaps not such a good idea after all.

Answers:

a) The principal must consider both a participation constraint, which ensures that the agent is willing to take the contract (Individual rationality condition). This IR condition ensures that it is better for the agent to take the contract comparing to not taking it. The second type of condition is an incentive compatibility constraint (IC), which ensures that it is better for the agent to do in accordance with the wish by the principal compared to any other behavior.

b) There are two cases. One where there is a risk related to the final outcome and one in which there is no risk. Or similarly that there is asymmetric information. In one case the Principal can observe the action of the agent and in the other there is some noise in this observation. When the action can be observed then profit sharing is not such a good idea since it does not leave the agent as a residual claimant and his behavior is thus different from an optimal behavior (e.g. different from a MC=MP condition). When there is risk or uncertainty in the observation it may be beneficial to share the risk between Principal and agent.

Question 3

a) Arrow proved a very powerful result that is often disregarded in practical policy formulations. Explain what his result was and why it is so important.

b) In modern democracies pair wise majority voting is the applied principle for making joint decisions. This violates one of Arrows basic conditions that must be satisfied by a social decision rule. Explain what this condition is and why this violates the condition, you may illustrate this by an example.
c) Another way of making decisions is ranking alternatives. However, this also violates one of the conditions. Which condition and why? Again you may illustrate using an example.

Answers:

a) It is his Impossibility theorem that states that a social decision rule (SDR) that satisfies being a total preorder, if all individual prefer A to B then so should the SDR and finally the independence of irrelevant alternatives, then the SDR must be dictatorial. This is quite strong since this implies that we cannot hope to find any SDR to help us making joint decisions.

b) Majority voting violates the transitivity condition (so the SDR is not a total preorder). An example with a choice between three alternatives may show this. Depending on the order of the pairwise voting any of the alternatives can be selected. A problem is thus that the decision process may be manipulated

c) Rank ordering violates the IIA condition. An example with three alternatives can illustrate that a tie between two alternatives can be broken by introducing a third alternative.

Question 4

a) Consider a monopoly firm, which can exercise price discrimination. Is it possible that the profit maximising choice of this firm is also efficient?
b) If the firm is facing two types of customers – wealthy and poor – but cannot distinguish between them, how should the firm then behave if it can price discriminate? Is this behaviour also efficient?

Answers:

a) The firm can implement perfect price discrimination, where each item of the product is sells is sold at a different price. Through this, it will be extract the entire consumer surplus by pricing each item according to the willingness to pay for the goods until the price for the last item is equal to the marginal cost. This is efficient, but of course there is a distributional effect.

b) Now the firm will exercise price discrimination of degree 2, where it offers two different packages. One intended for the wealthy and one for the poor. It has to make sure that the wealthy do not have incentives to choose the package for the poor and vice versa.

Question 5

Consider an economy with two consumers Arthur and Beatrice, and two commodities: a private consumer good and a public good. Arthur and Beatrice can consumer positive quantities of the two goods. Arthur's endowment is $\omega_A > 0$ of the private consumer good and Beatrice has´$\omega_B > 0$.
Arthur has preferences that can be represented by the utility function $u_A(x_A, G) = x_A^{\alpha} G^{1-\alpha}$, where x_A is his consumption of the public good, G is the quantity of the public good, and $0 < \alpha < ½$. Beatrice correspondingly has $u_B(x_B, G) = x_B^{\beta} G^{1-\beta}$ where $0 < \beta < ½$.
From the beginning we do not have any of the public good, but it can be produced by using x units of the consumer good to give x units of the public good, where $x \geq 0$.

a) Let each of the two consumers choose their own contribution $g_i \geq 0$ from their endowment ω_i , as a donation to the production of the public good, where we now will consider the equilibrium (a Nash equilibrium). Is it possible that a free-rider case can arise? You should prove your case either by an example or a proof.

In the next questions we assume that both consumers have equal endowments of the private good (i.e. $\omega_A = \omega_B = \omega > 0$)

b) How much of the public good is produced in an equilibrium where the contributions from the two are voluntary?
c) Find the Pareto optimal quantity of the public good assuming that Arthur has to pay for the entire quantity. Do the same when it is Beatrice who must finance all of the public good. Compare the two results and comment.
d) In the special case where $\alpha=\beta$ the quantity of the public good is smaller than the Pareto optimal quantity if based on voluntary contributions. Show this.
e) How can a regulator ensure (that is what instruments are available to a regulator) that we get the Pareto optimal quantity of the public good?

Answers:

a) We first find the reaction functions for both A and B: $b_A(g_B) = max\ [(1-\alpha)\ \omega_A - \alpha\ g_B\ ,\ 0\ ]$, *and* $b_B(g_A) = max\ [(1-\beta)\ \omega_B - \beta\ g_A\ ,\ 0\ ]$. *This means that a free rider situation can exists. E.g. Beatrice will freee ride in equilibrium when* $\omega_B \leq [\beta(1-\alpha)/(1-\beta)]\omega_A$, *since an optimal voluntary contribution is* $g_B = 0$, *while Athur chooses* $g_A = (1-\alpha)\omega_A$. *This is an equilibrium (Nash)since the choices are the optimal choices for each of A and B, given the other agents choice.*

b) When $\omega_A = \omega_B = \omega$ *we find that*: $g_A^* = (1-(2-\beta)\alpha)\omega/(1-\beta\alpha)$, $g_B^* = (1-(2-\alpha)\beta)\omega/(1-\beta\alpha)$, *such that* $G^* = (2(1-\alpha)(1-\beta))\omega/(1-\beta\alpha)$

c) *The criteria for Pareto optimality in the case of public goods is that sum of MRS equals 1, which is the marginal costs of producing the public good. Hence,* $((1-\alpha)\ (\omega_A - g_A))/(\ \alpha(g_A + g_B)) + ((1-\beta)\ (\omega_B - g_B))/\ \beta(g_A + g_B) = 1$. *When Arthur is financing the public good alone we get* $G_A' = (\beta(1-\alpha) + \alpha(1-\beta))\omega/\beta$. *And when Beatrice alone finances the public good we get:* $G_B' = (\beta(1-\alpha) + \alpha(1-\beta))\omega/(\alpha)$. *This means that the quantity of the public good will be larger when the consumer with the weakest preferences for the public good must finance it.*

d) When $\beta=\alpha$ *we find that there is too little of the public good produced, since* $\frac{(1-\alpha)^2}{1-\alpha^2}$ *is smaller than (1-α), which is the share of "income"/endowment that is voluntarily contributed to the public good and the Pareto optimal share respectively.*

e) He can impose so-called Lindahl prices where each agent pays an individual price or he can let the agents participate in a truth revelation mechanism such as the Clarke-Groves mechanism. However, both are difficult to implement since they require much information. Moreover, the Clarke mechanism is inefficient in itself due to wasted resources on the Clarke tax.