Written Exam for the B.Sc. in Economics Summer 2010

Microeconomics A

Final Exam

11 June 2010

(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

a) Consider a firm that is profit maximising. What will we expect to be observing when we compare the firm's behaviour in different time periods?
b) Show that when a firm is profit maximising then its factor demand will decrease when the price on the factor increases.

Answers

a) That it satisfies the weak axiom of profit maximisation. That is its choice in one period gives a higher profit than any other combination of inputs – including the choice in the other period and vice versa.
b) We can use the information from a) to prove this. Namely that $p \cdot y - w_1 \cdot q_1 - w_2 \cdot q_2 \geq p \cdot y' - w_1 \cdot q_1' - w_2 \cdot q_2'$ *and* $p' \cdot y' - w_1' \cdot q_1' - w_2' \cdot q_2' \geq p' \cdot y - w_1' \cdot q_1 - w_2' \cdot q_2$*, which when combined gives* $(p' - p) \cdot (y' - y) - (w_1' - w_1) \cdot (q_1' - q_1) - (w_2' - w_2) \cdot (q_2' - q_2) \geq 0$ *and for a change in an input price gives us directly that a price increase must lead to a demand decrease.*

Question 2

In the CAPM model we have a β parameter. Explain what this parameter implicates in this model and why a negative value has a specific interest.

Answer

The CAPM-model uses that the return of a risky asset i is $r_i = r_f + \beta_i \cdot (r_m - r_f)$*, , m is the market portofolio while f is a risk free asset; the different r is the expected returns and* β_i *is an expression of the covarians between the return on the risky asset and the market portofolio; that is with a covarians in the nominator for* β_i *and the market variance in the denominator. If* $\beta_i = 1$ *then the asset is perfectly correlated with the market and the expected return must correspond to this. If* $\beta_i > 1$ *then the asset is more risky than the market and the return must be larger. If* $\beta_i < 1$ *then the asset is less risky and we thus expect a smaller return.* $\beta_i < 0$ *is particularly interesting since the asset varies opposite to the market. This means that we can use this asset to insure against periods with declining returns, because the asset then gives a higher return.*

Question 3

Consider a Koopmans-economy with one consumer having preferences over two commodities that can be represented by the utility function $u(x_1, x_2) = x_1 x_2$
Let commodity 1 be a good that can be transformed into commodity 2 in a firm using the production function $y = q^{\frac{1}{2}}$, where $q \geq 0$ is input of commodity 1 and y is the firms output of commodity 2.

a) Explain what we must assume about the agents in this economy to be able to complete the analysis.

Assume that the endowment in the economy is $(\omega_1, \omega_2) = (12, 0)$ and let the price on good 2 be equal to 1.

b) Find the equilibrium in this economy? Is this equilibrium Pareto optimal – why/why not?

Answers

a) There is in fact only one agent in the economy. The agent is the only consumer, but he is also the owner of the firm. When he makes his choice as a consumer then he must act as though his choice does not influence the optimal choice for the firm. Similarly when he acts

as the firm owner then he must also not consider how the choices influence him as a consumer.

b) *The firm's problem:* $max\ \pi = pq^{1/2} - q$ *where the price on good 1 is set to 1. The solution is* $q^{1/2}=p/2$, *or* $y=p/2$, *the factor demand is* $q=p^2/4$ *and profit is:* $\pi=p^2/4$. *The consumers problem is Max u s.t.* $x_1 + p\ x_2 = 12+p^2/4$ *,with solution:* $(x_1, x_2)=0.5(12+p^2/4)$, $0.5((27+p^2/4))/p$. *Solve the equilibrium in one market* $x_1 + q=27$,*insert and get that* $p=4$ *and that* $x_1=8$ *and* $x_2=2$. *Due to the first welfare theorem this is also PO.*

Question 4

a) Using the Slutsky equation, explain what a Giffen good is and what must be satisfied for a good to be Giffen good.

b) The special thing about Giffen goods is sometimes also satisfied for non-Giffen goods. Explain what must be satisfied for this to be the case and give an example.

Answers

a) A Giffen good is a good where demand increase when the price increases. In the Slutsky equation we have a substitution effect that is always negative, but if we have a very inferior good then the income effect may be so large that it dominates the substitution effect.

b) We are considering normal goods, where we have a large endowment. The combined income (normal income and endowment income) effect is large enough to dominate the negative substitution effect when we comsider the Slutsky equation for this case. A relevant example is labour supply – and its complementary leisure demand, where a increase in the wage may lead to an increase in the demand for leisure.

Question 5

Iris wants to consume in two time periods. She has preferences for consumption in the two time periods that can be described by the utility function $u(x_1,x_2)= x_1^{1/2}x_2$. She has an income *m* in period one that can be saved and used in period two. There is no income in period 2, where we assume that she is retired. The interest rate is *r* and assume that the price on the consumption good is 1.

a) What is her consumption in the two time periods?

b) What can we say about Iris' welfare following the change in the interest rate from 2 to 1 per cent? – you should calculate the consumer's surplus for Iris as part of your answer

c) What is the income change Iris need in period 1 such that she is unaffected by the increase in the interest rate? Relate this income change to the consumers surplus you calculated in c)

d) What happens with your answer to the latter part of c) if her preferences had been quasi-linear?

Answers:

a) The most difficult thing here is to formulate the budget constraint, which is $\frac{x_2}{1+r}+x_1=m$. *Now we can see that her preferences are Cobb-Douglas and we can thus see that the solution is* $x_1=\frac{m}{3}$ *and* $x_2=\frac{2m}{3(1+r)}$. *This may of course also be solved using Lagranges etc.*

b) The change in CS is a calculation of her welfare change when the price on consumption in period 2 changes. The change is -5m/3 so she is obviously worse off. This is because she

earns a lower return on her savings and must thus reduce consumption in period 2. She derives a higher utility from consumption in this period and she is thus "punished" relatively more from shifting consumption between the two periods; so it makes sense.

c) *The answer we are looking for here is the Equivalent variation, which is found as the income that leaves her with the same utility as before the price change (a Hicks compensation). "Uaffected" may also be considered as the Slutsky compensation giving her the same consumption. Hence, we are simply finding another welfare measure. The minimum income to ensure the same utility level is* $\frac{3m}{9^{\frac{2}{3}}}\left(\frac{1,02}{1,01}\right)^{\frac{2}{3}}$ *from this we subtract the original income to find the EV.*

d) *If she has quasi-linear preferences then the EV and the CS will be the same since there is no income effect.*

Question 6

Consider a tax on income. Let the tax generate a revenue of *B* Euro. Assume that the revenue is paid back to the consumers. Explain why such a policy is not 'neutral' and illustrate this in a diagram.

Answer

The revenue that is collected is based on the labour supply AFTER the price increase. This increase reduces the activity level. In total there is an efficiency loss – the dead weight loss.