

Guide to answers to Written Exam for the B.Sc. or M.Sc. in Economics

June 2011

Mikroøkonomi B

Final Exam

Problem 1

Consider a beer shop which has constant marginal costs of 2 \$ of providing customers with beer.

The shop faces two customers: A youngster whose demand function for beer is $D_y(p) = \max \{ 10 - p, 0 \}$, with p being the price per beer, and an older customer whose demand function is $D_o(p) = \max \{ 8 - p, 0 \}$.

The shop owner decides to create two different packages, each containing a number of beers, and charging an amount for the whole package, hence using second-degree price discrimination.

- Show that in order to maximize profits, the package aimed at the older customer should contain four beers
- Which amounts, S_y and S_o , should the shop charge for the two packages, and what will maximum profits be?

Answer: At $y_o = 4$, the distance from $c = 2$ to $p_y()$ is 4, which is twice the distance from $c = 2$ to $p_o()$. Hence (Varian 25.3), this is the optimal size of the package to the older customer. The youngster's package contains 8 beers. The amounts charged are $S_o = 24$, $S_y = 40$, and profits are 40.

Problem 2

A coffee plantation, producing for a perfect competition market, has the cost function $TC(y) = y^3/3 - 6y^2 + 46y + 100$, with y being the daily output measured in tons, and all amounts being measured in 1.000 DKK.

- Show that the marginal costs at $y = 8$ are 14
- Which quantity y is it (short-term) profit-maximizing for the plantation to supply when the market price is 14 (14,000 DKK per ton of coffee, or 14 DKK per kilo)?

Answer: $MC(y) = y^2 - 12y + 46$, $AVC(y) = y^2/3 - 6y + 46$ which has its minimum at $y = 9$: $\text{Min}AVC = 19$. At $y = 8$, MC will be 14, equal to price, so 8 is a local maximum for profits; however, $AVC(8)$ is 19.33, significantly higher than the price, so the factory should decide not to produce, $y = 0$, to avoid negative producer's surplus.

Problem 3

Consider a market with perfect competition. The demand side is characterized by a stable (long-term) downward-sloping demand curve. On the supply side there is a large number of identical (potential) suppliers, all with the same production technology, having the same minimum efficient scale (production size at which long-term average costs are minimized). There is free entry and exit for suppliers.

- Is it fair to claim that should the government decide to introduce a 1 \$ tax on this good, then in the long run, the price paid by consumers would increase by 1 \$ (all other things being equal, of course)?
- What would happen on the supply side, should such a 1 \$ tax be introduced?

Answer: Yes, as the long-run supply curve, allowing for exit and entry, is (almost) horizontal (Varian 23.4). A tax will decrease the quantity demanded in equilibrium, hence squeezing out some suppliers, reducing the number of producers active in the market.

Problem 4

Consider an economy with two agents, Andy and Bridget. Initially, Andy has an endowment $\omega_A > 0$ of the private good, and similarly Bridget has $\omega_B > 0$. A public good can be produced, as one unit of the private good can be transformed into one unit of the public good. Andy's preferences can be represented by the utility function $u_A(G, x_A) = G^a \cdot x_A^{(1-a)}$, and Bridget's preferences by $u_B(G, x_B) = G^b \cdot x_B^{(1-b)}$, with $0 < b < a < 1$, G being the non-negative quantity of the public good.

- Give the first order condition for G being the efficient (Pareto-Optimal) level of the public good
- Discuss the statement: "There is clearly a unique quantity of the public good which is efficient (Pareto Optimal) for this economy, irrespective of how much Andy owns, and how much Bridget owns"

Answer: The FOC is $(a \cdot x_A) / [(1-a) \cdot G] + (b \cdot x_B) / [(1-b) \cdot G] = 1$, with a and b being different from 1, the levels of private consumption will clearly influence this FOC; another way of realizing this is acknowledging that both consumers have preferences that are certainly not quasi-linear.

Problem 5

Kenneth Arrow set up the challenge of finding a way of aggregating individual preferences (rankings of alternative states, or allocations, for society) into social preferences, in a way that obeyed three conditions:

- When all individual preferences are total preorders (total, reflexive, and transitive), the resulting social preferences should be so, too
- The Pareto Principle (when every individual prefers x over y , so should society)
- "Independence of irrelevant alternatives" (society's ranking of x vs. y should depend only on how individuals rank x vs. y).

- Verify that choosing one specific individual's preferences to be that of society will honor those three conditions

Answer: i) When every individual's preference is a total preorder, so will the preferences of that particular individual whose preferences are chosen. ii) If all prefer x over y , so will that particular individual, and hence so will society. Iii) Society's ranking of x vs. y will depend only on that particular individual's ranking of those two, and not on any individual's ranking of irrelevant alternatives, z .

Problem 6

Stiglitz and others have argued that credit rationing may be explained by moral hazard when there is asymmetric information.

- Present the main elements in this line of argument

Answer: See memo by Birgitte Sloth. Very basically, if the principal (the lender) wants to capture all revenue in case of success in the safer project, then the agent (the borrower) will clearly have an incentive to opt for

the risky project (moral hazard). This is because in case of failure, the agent gets nothing, whereas he or she will obtain a strictly positive income in case of success, hence a strictly positive expected income which is clearly better than getting zero for sure. The principal, knowing this, will set the rate of interest low enough that the expected income for the agent in choosing the safe project is at least as high as the expected income from choosing the safer project (incentive compatibility). This rate of interest may be so low that the demand for loans exceeds the capital available; hence credit rationing occurs. And no lender has an incentive to raise the rate of interest, because this will tempt the borrowers into the risky project.

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